

# The Builder.

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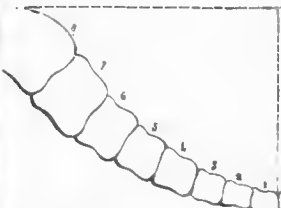
SEEMING  
that scarcely  
of greater im-  
portance can  
be any subject  
of architect-

ture, whether simply  
practical or simply  
decorative (which indeed we  
hold to be inseparable,  
and into the discussion of  
which we shall by-and-by  
enter, fearless of being tri-  
umphant), we resume our  
last week's paper upon

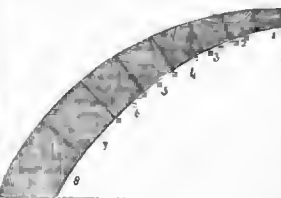
## FRAMING BRIDGES.

Before going further, we beg to say, fanciful  
theories have retarded infinitely the science of  
arches; most of those broached have in suc-  
cession been given up, though very artificial,  
yet as very untenable; very few of them have  
effected even partially that which they pur-  
ported to perform, while the greater part of  
them have violated that great object of science,  
TO DO THINGS WISELY WITH THE LEAST  
NECESSARY MEANS.

In the pendant catenarian construction,



every link or vertebra is strained by the weight  
of all the others beneath it in the series; and  
in the inverted masonry catenary, every voussoir  
is compressed by the weight of all the voussoirs



above it. Therefore, all arches whatever,  
whether of masonry or brickwork, have their  
voussoirs compressed in this manner, though  
from their imperfect design and formation,  
gravity deranges their component parts, dis-  
torts their curves, and brings them to ruin. All  
the theories on the equilibrium of arches, by  
which an attempt is made to balance the vous-  
soirs by causing them to slide together on their  
arch-joints towards a centre, are erroneous; no  
such effect ever takes place in arches, unless they  
be in jeopardy, ill at ease in their parts, settling  
through defective foundation, or from some other  
cause tending to bring them to a state of ruin.

On the contrary, great address has been often  
used to prevent utterly such sliding, as in the  
case of Blackfriars' bridge, where the vous-  
soirs are joggled by a  
cubic foot of hardstone  
being let into each  
arch-joint. In all  
arches of brickwork  
set in Parker's, or any  
other quickly-setting  
cement (which mode of practice we, for various  
reasons, deprecate, except in arches formed in  
old work), no sliding to a centre can take place  
without such grizzling cements fracturing, as,  
indeed, they do, simply from the curvature of  
an arch altering in form, through the work set-  
tling to a state of rest. If, then, pains and ex-  
pense be employed in the endeavour to effect  
the equilibrium of an arch, by causing its vous-  
soirs to slide upon each other, and equal pains  
and expense be resorted to for preventing them  
from so sliding, it must be evident that such  
pains and expense neutralise each other; and it  
will be fortunate if they leave the arch as well  
off as it would have been without their use, and  
with no weakness caused by casting extra bur-  
then upon the foundation.

But what says Dr. Robison on this very  
subject?—

"This much will serve, we hope, to give the  
reader a clear notion of this celebrated theory of the  
equilibrium of arches, one of the most delicate and  
important applications of mathematical science.  
Volumes have been written on the subject, and it  
still occupies the attention of mathematicians. But  
we beg leave to say, with great deference to the  
eminent persons who have prosecuted this theory,  
that their speculations have been of little service,  
and are little attended to by the practitioner. Nay,  
we may add, that Sir Christopher Wren, perhaps  
the most accomplished architect that Europe has  
seen, seems to have thought it of little value; for,  
among the fragments which have been preserved of  
his studies, there are to be seen some imperfect dis-  
sertations on this very subject, in which he takes no  
notice of this theory, and considers the balance  
of arches in quite a *novus modus*. These are  
collected by the author of the Account of Sir  
Christopher Wren's family. This man's great  
sagacity, and his great experience in building, and  
still more his experience in the repairs of old and  
crazy fabrics, had shewn him many things very in-  
consistent with this theory, which appears so spec-  
ious and safe. The general facts which occur in  
the failure of old arches are highly instructive, and  
deserve the most careful attention of the engineer;  
for it is in this state that their defects, and the pro-  
cess of nature in their destruction, are most dis-  
tinctly seen. We venture to affirm, that a very  
great majority of these facts are irreconcilable to  
the theory. The way in which circular arches com-  
monly fail, is by the sinking of the crown and the  
rising of the flanks. It will be found by calcula-  
tion, that in most of the cases it ought to have been  
just the contrary. But the clearest proof is, that  
arches very rarely fail where their load differs most  
remarkably from that which this theory allows.  
Semicircular arches have stood the power of ages,  
as may be seen in the bridges of ancient Rome, and  
in the numerous arcades which the ancient inhabi-  
tants have erected. Now all arches which spring  
perpendicularly from the horizontal line, require by  
this theory, a load of infinite height; and, even to  
a considerable distance from the springing of the  
arch, the load necessary for the theoretical equi-  
librium is many times greater than what is ever laid  
on those parts; yet a failure in the immediate  
neighbourhood of the spring of an arch is a most  
rare phenomenon, if it ever was observed. Here is  
a most remarkable deviation from the theory; for,  
as is already observed, the load is frequently not the  
fourth part of what the theory requires."

"Many other facts might be adduced which show  
great deviations from the legitimate results of the  
theory. We hope to be excused, therefore, by the  
mathematicians for doubting of the justness of this  
theory. We do not think it erroneous, but defec-  
tive, having on circumstances which we apprehend  
to be of great importance; and we imagine that the  
defects here arisen from the very anxiety of the  
mathematicians to make it perfect. The arch-stones  
are supposed to be perfectly smooth or polished,  
and not to be connected by any cement, and there-  
fore to sustain each other merely by the equilibri-  
um of their vertical pressure. The theory ignores this

equilibrium, and this only, leaving unnoticed any  
other causes of mutual action."—*System of Me-  
chanical Philosophy, Brewster's Edition, Edin-  
burgh, A.D. 1822.*

After very mature consideration of the sub-  
ject, we have come to the conclusion, that  
NATURE is the active force in arches and vaults;  
the exercise of this principle lies in the avoid-  
ance of all cross strain and the pressing of  
every stone to its neighbours: by this free-  
masonry principle stand all the buildings of  
Pointed Architecture which approach perfec-  
tion. Drift commences at the summit of  
every vault and pinnacle, and is carried through  
every stone of a fabric till it reaches the ground  
at the feet of the buttresses, walls, and  
columns.

All the address of a master is called forth  
to cause the drift or gravitation of materials  
to operate exactly at right-angles to each stone  
which receives pressure. Hence the bed-  
jointing of each course in a work should be  
formed exactly at right-angles to the direction  
of the active drift, in order that, as in the *ru-  
mation-calcary*, the risk lies in failure  
through the tension of the chains, so in the  
catenarian masonry arch, THE RISK MAY BE  
CONCENTRATED SOLELY IN THE FRANGI-  
BILITY OF THE MATERIALS, no failures occur-  
ring till they become palerived.

Our deductions from these theories, and  
their application to the subject engaging our  
attention, will be given to our next.



## MEETING OF THE MASTER CARPENTERS' SOCIETY.

A MEETING OF THE Master Carpenters was  
held on Wednesday evening last, at the Free-  
masons' Tavern, Great Queen Street, being the  
first of the new year, for the purpose, among  
other matters, of appointing a committee to  
watch in its progress through Parliament  
the proposed New Metropolitan Build-  
ing Act, and to give notice of a  
proposed amendment in the Rules of the So-  
ciety for the election of members.

The minutes of the last meeting having been  
read by the secretary, and unanimously con-  
firmed, Mr. Biers, the chairman, pro-  
posed the confirmation of the election of a  
member that took place at the last meeting,  
which was seconded by Mr. Knight, and  
carried without opposition.

Mr. Biers then said he thought  
there ought to be some alteration in  
the laws of the society for the election of  
members; for the delay he considered too  
great from the time they were proposed to  
the time they were admitted as members of the  
society. He had two new members to pro-  
pose at the present meeting; and, according to  
the regulation then in existence, it would be  
four months before those two gentlemen could  
sit as members, although there could be no  
objection made to their joining the society.  
This delay was too great; and what he would  
suggest as an amendment was, that it should  
be sufficient for any eligible person wishing to  
become a member, to write to the secretary,  
signifying such his desire, and that his name be-  
ing written in the circular to the members, if any  
one of the society had any new reason why he should  
not be admitted a member, he might oppose  
his election; and thus, by such an arrangement,  
two months would be saved.